

The opinion in support of the decision being entered today was *not* written for publication and is *not* binding precedent of the Board.

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE BOARD OF PATENT APPEALS
AND INTERFERENCES

Ex Parte JOHN WHITMAN and JOHN DAVLIN

Appeal No. 2006-1361
Application No. 09/997,019

ON BRIEF



Before KRASS, JERRY SMITH and MACDONALD, Administrative Patent Judges.

JERRY SMITH, Administrative Patent Judge.

This is a decision on the appeal under 35 U.S.C. § 134 from the examiner's rejection of claims 1-22, which constitute all the claims pending in this application.

The disclosed invention pertains to a method for preparing a surface of a semiconductor device structure for planarization.

Representative claim 1 is reproduced as follows:

1. A method for preparing a surface of a semiconductor device structure for planarization, comprising:

providing a semiconductor device structure including at least one recess formed in a surface thereof and a first material layer substantially filling the at least one recess and covering the surface, the first material layer having a nonplanar surface;

applying a second material to the first material layer; and

spreading the second material over the first material layer so as to form a second

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material layer having a planar surface without requiring subsequent planarization of the second material.

The examiner relies on the following references:

Yoshihara	6,117,486	Sep. 12, 2000
Hsieh	6,228,711	May 08, 2001
Wang	6,461,932	Oct. 08, 2002

(filed Dec. 14, 1998)

Claims 1, 2, 6, 7, and 10-22 stand rejected under 35 U.S.C. § 102(e) as being anticipated by the disclosure of Wang. Claims 3, 4, 5, 8, and 9 stand rejected under 35 U.S.C. § 103(a). As evidence of obviousness the examiner offers Wang in view of Yoshihara with respect to claims 3-5, and Wang in view of Hsieh with respect to claims 8 and 9.

Rather than repeat the arguments of appellants or the examiner, we make reference to the briefs and the answer for the respective details thereof.

OPINION

We have carefully considered the subject matter on appeal, the rejections advanced by the examiner and the evidence of anticipation and obviousness relied upon by the examiner as support for the rejections. We have, likewise, reviewed and taken into consideration, in reaching our decision, the appellants' arguments set forth in the briefs along with the examiner's rationale in support of the rejections and arguments in rebuttal set forth in the examiner's answer.

It is our view, after consideration of the record before us, that the evidence relied upon supports the examiner's rejection of claims 1, 2, 6-9, and 19-22. We reach the opposite conclusion with respect to claims 3-5 and 10-18. Accordingly, we affirm-in-part.

We consider first the examiner's rejection of claims 1, 2, 6, 7, and 10-22 as being anticipated by the disclosure of Wang. Anticipation is established only when a single prior art reference discloses, expressly or under the principles of inherency, each and every element of a claimed invention as well as disclosing structure which is capable of performing the recited functional limitations. RCA Corp. v. Applied Digital Data Systems, Inc., 730 F.2d

1440, 1444, 221 USPQ 385, 388 (Fed. Cir.); cert. dismissed, 468 U.S. 1228 (1984); W.L. Gore and Associates, Inc. v. Garlock, Inc., 721 F.2d 1540, 1554, 220 USPQ 303, 313 (Fed. Cir. 1983), cert. denied, 469 U.S. 851 (1984). The examiner has indicated how the invention of these claims is deemed to be fully met by the disclosure of Wang [answer, pages 3-7].

With respect to independent claim 1, appellants argue that Wang lacks any express or inherent description of spreading a second material layer over a first material layer so as to form a second material layer having a planar surface as claimed. Appellants argue that the drawings of Wang cannot be relied on as disclosing that the upper surface 62 in Figure 4d is substantially planar, and that although Wang specifically discloses that the surface is “largely planar,” Wang discloses that the term “largely planar” is a relative term and that there may be slight depressions in the surface. Appellants assert that Wang’s description acknowledges the fact that conventional spin-on processes are incapable of forming material layers with planar surfaces [brief, pages 9-10].

The examiner responds that appellants’ own specification describes the surface resulting from use of the claimed invention as “substantially planar.” Thus, the examiner argues that appellants’ own disclosure does not eliminate the possibility of the existence of slight depressions as taught by Wang, and that the teaching of “largely planar” in Wang means “substantially planar” within the meaning of appellants’ own disclosure. [answer, pages 8-14].

Appellants respond that the term “substantially planar” does not include surfaces with depressions, but only surfaces with minor deviations from planar that the artisan would consider to be planar. Appellants also respond that the layer of spin-on glass, as taught by Wang, has a high viscosity that is unlikely to result in a planar surface as recited in claim 1 [reply brief, pages 2-4].

We will sustain the examiner’s rejection of claim 1 as being anticipated by Wang. The key section of Wang reads as follows:

Importantly, smoothening layer 60 has an upper surface 62 which is considerably smoother than upper dielectric surface 58.

Ideally, upper smoothening surface 62 is largely planar. In actuality, there may be slight depressions in upper smoothening surface 62 at the locations of the deepest parts of the depressed portion of upper dielectric surface 58. Compared to upper dielectric surface 58, upper smoothening surface 62 is largely planar. [column 6, lines 29-36, emphasis added].

It is clear from this paragraph that the upper surface 62 of smoothening layer 60 in Wang is intended to be, or is ideally, planar. We interpret this paragraph to mean that a true planar surface may not always be achieved in actuality based on the depressions of the dielectric layer and the properties of the smoothening material. Since this paragraph states that there may be slight depressions, it also suggests that there may not be slight depressions. Therefore, we interpret this paragraph of Wang as disclosing that a planar upper surface may not always be achieved, but the intent is to select materials and conditions such as temperature that are appropriate for achieving the ideal “largely planar” surface.

With respect to claims 2, 6, 7 and 19-22, since these claims depend from claim 1 and have not been separately argued by appellants, we also sustain the examiner’s anticipation rejection of these claims.

With respect to claim 10, appellants argue that Wang is clearly limited to applying the smoothening layer in such a manner that the depressed portions of the dielectric surface are completely filled while the peaks are covered [brief, page 11]. The examiner responds that during the spinning process, initially the peaks are not covered with the smoothening material, but eventually, all the surface is uniformly coated as a result of the spinning operation and that this operation is indistinguishable from Wang [answer, page 15]. Appellants respond that claim 10 refers to the state of the wafer after the spinning process has been completed. They argue that planarization in Wang occurs in a subsequent process [reply brief, pages 4-5].

We will not sustain the examiner’s anticipation rejection of claim 10. Claim 10 depends from claim 1 and further limits the spreading step. The spreading step of claim 1 results in

the spread material having a planar surface. This does not occur until the spin-coating has ended. Therefore, the condition of claim 10 that the spreading partially fills at least one valley of the first material layer while leaving at least one peak of the first material layer substantially uncovered by the spread material must also occur at the end of the spin-coating process. The examiner's rejection, however, requires that the spin-coating process of Wang be looked at after it has begun but before it has finished. Therefore, we agree with appellants that the operation of Wang fails to meet the invention as recited in claim 10.

With respect to claims 11-18, since these claims depend from claim 10, we also do not sustain the examiner's rejection of these claims.

We now consider the rejections of the claims under 35 U.S.C. § 103. In rejecting claims under 35 U.S.C. § 103, it is incumbent upon the examiner to establish a factual basis to support the legal conclusion of obviousness. See In re Fine, 837 F.2d 1071, 1073, 5 USPQ2d 1596, 1598 (Fed. Cir. 1988). In so doing, the examiner is expected to make the factual determinations set forth in Graham v. John Deere Co., 383 U.S. 1, 17, 148 USPQ 459, 467 (1966). The examiner must articulate reasons for the examiner's decision. In re Lee, 277 F.3d 1338, 1342, 61 USPQ2d 1430, 1434 (Fed. Cir. 2002). In particular, the examiner must show that there is a teaching, motivation, or suggestion of a motivation to combine references relied on as evidence of obviousness. Id. at 1343, 61 USPQ2d at 1433-34. The examiner cannot simply reach conclusions based on the examiner's own understanding or experience - or on his or her assessment of what would be basic knowledge or common sense. Rather, the examiner must point to some concrete evidence in the record in support of these findings. In re Zurko, 258 F.3d 1379, 1386, 59 USPQ2d 1693, 1697 (Fed. Cir. 2001). Thus the examiner must not only assure that the requisite findings are made, based on evidence of record, but must also explain the reasoning by which the findings are deemed to support the examiner's conclusion. However, a suggestion, teaching, or motivation to combine the relevant prior art teachings does not have to be found explicitly in the prior art, as the teaching, motivation, or suggestion may be implicit from the prior art as a whole, rather than expressly stated in the

references. The test for an implicit showing is what the combined teachings, knowledge of one of ordinary skill in the art, and the nature of the problem to be solved as a whole would have suggested to those of ordinary skill in the art. In re Kahn, 441 F.3d 977, 987, 78 USPQ2d 1329, 1336 (Fed. Cir. 2006) (citing In re Kotzab, 217 F.3d 1365, 1370, 55 USPQ2d 1313 (Fed. Cir. 2000)). See also In re Thrift, 298 F. 3d 1357, 1363, 63 USPQ2d 2002, 2008 (Fed. Cir. 2002). These showings by the examiner are an essential part of complying with the burden of presenting a prima facie case of obviousness. Note In re Oetiker, 977 F.2d 1443, 1445, 24 USPQ2d 1443, 1444 (Fed. Cir. 1992). If that burden is met, the burden then shifts to the applicant to overcome the prima facie case with argument and/or evidence. Obviousness is then determined on the basis of the evidence as a whole and the relative persuasiveness of the arguments. See id.; In re Hedges, 783 F.2d 1038, 1039, 228 USPQ 685, 686 (Fed. Cir. 1986); In re Piasecki, 745 F.2d 1468, 1472, 223 USPQ 785, 788 (Fed. Cir. 1984); and In re Rinehart, 531 F.2d 1048, 1052, 189 USPQ 143, 147 (CCPA 1976). Only those arguments actually made by appellants have been considered in this decision. Arguments which appellants could have made but chose not to make in the brief have not been considered and are deemed to be waived [see 37 CFR § 41.37(c)(1)(vii)(2004)].

We consider first the rejection of claims 3-5 based on Wang and Yoshihara. The examiner has explained how the invention of these claims is deemed to be rendered obvious by the collective teachings of the applied prior art [answer, page 7]. Appellants argue that the artisan would not have been motivated to combine the teachings of Wang with those of Yoshihara. Specifically, appellants argue that using the technique taught by Yoshihara in Wang would result in a smoothening layer 60 that is just as non-planar as the dielectric layer that it covers. Appellants argue, therefore, that the artisan would have no expectation that the combination of Wang and Yoshihara would result in a smoothening layer 60 that has a planar upper surface [brief, pages 15-16]. The examiner responds that the artisan would have been motivated to combine the teachings because Yoshihara provides improved spin coating processing techniques [answer, pages 18-19]. Appellants respond that Yoshihara fails to

teach or suggest gradually decreasing the rate of spinning to a second speed as claimed. They argue that Yoshihara teaches that the speed is “drastically reduced” using a deceleration of 30,000 rpm/s. Appellants further argue that Yoshihara fails to teach that the rate of spinning is gradually increased as claimed. Appellants assert that the artisan would not have been motivated to apply the teachings of Yoshihara to Wang in order to form a second material layer having a planar surface without requiring subsequent planarization of the second material [reply brief, pages 5-6].

We will not sustain the examiner’s rejection of claims 3-5. Although Yoshihara teaches a spinning technique that results in a coating of uniform thickness, and could yield a surface which is planar in some places, we agree with appellants that there is no teaching that this technique would result in a layer 60 which has an upper planar surface over the entire device as desired by Wang because the recesses and the dielectric surface would both be coated by the same amount. Therefore, the non-planar features of the dielectric layer would still be present after the spin-coating process taught by Yoshihara. We also agree with appellants that there is no teaching in Yoshihara of gradually decreasing and increasing the spinning rates. The examiner has failed to respond to this argument and has not pointed to any portion of Yoshihara which teaches this claimed feature.

We now consider the rejection of claims 8 and 9 based on Wang and Hsieh. The examiner has explained how the invention of these claims is deemed to be rendered obvious by the collective teachings of the applied prior art [answer, page 8]. Appellants’ only argument is that these claims are patentable based upon their dependency from claim 1 [brief, page 16]. Since we find that the examiner has established at least a prima facie case of obviousness with respect to these claims, and since appellants have not presented any persuasive arguments in rebuttal, we sustain the examiner’s rejection of these claims.


In summary, we have sustained the examiner’s rejections of the claims with respect to claims 1, 2, 6-9, and 19-22, but we have not sustained the examiner’s rejections of the claims


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with respect to claims 3-5 and 10-18. Therefore, the decision of the examiner rejecting claims 1-22 is affirmed-in-part.

No time period for taking any subsequent action in connection with this appeal may be extended under 37 CFR § 1.136(a)(1)(iv).

AFFIRMED-IN-PART


ERROL A. KRASS
Administrative Patent Judge


JERRY SMITH
Administrative Patent Judge


ALLEN R. MACDONALD
Administrative Patent Judge

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